

Introduction of the identification, situation, background, assessment, recommendations tool to improve the quality of information transfer during medical handover in intensive care

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Abstract

Objective: To audit the quality and safety of the current doctor-to-doctor handover of patient information in our Cardiothoracic Intensive Care Unit. If deficient, to implement a validated handover tool to improve the quality of the handover process.

Methods: In Cycle 1 we observed the verbal handover and reviewed the written handover information transferred for 50 consecutive patients in St George's Hospital Cardiothoracic Intensive Care Unit. For each patient's handover, we assessed whether each section of the Identification, Situation, Background, Assessment, Recommendations tool was used on a scale of 0–2. Zero if no information in that category was transferred, one if the information was partially transferred and two if all relevant information was transferred. Each patient's handover received a score from 0 to 10 and thus, each cycle a total score of 0–500. Following the implementation of the Identification, Situation, Background, Assessment, Recommendations handover tool in our Intensive Care Unit in Cycle 2, we re-observed the handover process for another 50 consecutive patients hence, completing the audit cycle.

Results: There was a significant difference between the total scores from Cycle 1 and 2 (263/500 versus 457/500, $p < 0.001$). The median handover score for Cycle 1 was 5/10 (interquartile range 4–6). The median handover score for Cycle 2 was 9/10 (interquartile range 9–10). Patient handover scores increased significantly between Cycle 1 and 2, $U = 13.5$, $p < 0.001$.

Conclusions: The introduction of a standardised handover template (Identification, Situation, Background, Assessment, Recommendations tool) has improved the quality and safety of the doctor-to-doctor handover of patient information in our Intensive Care Unit.

Keywords

Handover, quality improvement, patient safety, information transfer

Introduction

Since the implementation of the Working Time Directive in August 2009 there has been a significant change in the working patterns of junior doctors: from long working hours and on-call rotas to shift work and subsequently a rise in handovers between shifts.^{1,2} This increase in shift work has been shown to significantly decrease the continuity of emergency and post-operative care^{3,4} and as a consequence a detailed, accurate and up-to-date handover is essential to enhancing patient safety and maintaining our high-quality service provision.^{5–7} Any deficiencies in the

handover process can result in potentially dangerous errors in patient management, particularly within the intensive care setting.⁸

Throughout the last few decades, many similarities between the aviation industry and the medical

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profession have emerged. The tragic accident of the Continental Express Flight 2574 in 1991 has become a much-cited example of the dangers in poor quality shift handovers. A row of screws attaching the left horizontal stabiliser had been removed and not replaced during maintenance the night before the accident causing it to separate from the plane in mid-air. The flight crashed in a cornfield near Eagle Lake, Texas, killing all 14 people on board. The National Transportation Safety Board found that the error might have been detected had shift handover procedures between the day and night staff been followed.⁹ Triggered by this incident and others similar to it at the time, the aviation industry has developed robust, standardised handover techniques involving both face-to-face and written components to maximise aviation safety.^{10–12} The use of these aviation handover techniques has since been adapted and shown to significantly improve intra-hospital handovers from surgery to intensive care in the UK.¹³

On our cardiothoracic intensive care unit (CT ICU) there was no formal doctor-to doctor handover sheet except the one printed from the ward management system, which contained limited amounts of details (e.g. name, age, sex, reason for admission), sometimes none at all. Therefore, the quality of handover was heavily reliant on verbal communication, which can be highly variable. A study looking into the reliability of different forms of handover techniques between nurses found that after three separate handovers of the same information, the majority of detail was lost when the handover was purely verbal whereas when there was a written component to accompany verbal handover there was minimal information loss.¹⁴

This project arose after the identification of the potential loss of relevant information in our patient handovers. Two patients had significant incidental findings on their admission computed tomography (CT) scans: one had an 8 cm abdominal aortic aneurysm, the other a suspicious colonic mass. We were acutely aware that if this information was not documented as well as verbally handed over this information may be forgotten by the time ICU discharge was imminent resulting in a critical incident. With this in mind and the knowledge that communication issues are amongst the most frequent contributory factors of adverse events identified in retrospective adverse-events analyses,^{15,16} the need for this audit was clear.

On developing our pro forma we found multiple guidelines from different professional bodies – including the World Health Organisation (WHO),¹⁷ Royal College of Physicians¹⁶ and the British Medical Association¹⁸ highlighting the need for a standardised handover tool. The use of the (Situation, Background, Assessment and Recommendation) SBAR as a tool has been recommended by the WHO due to its multi-disciplinary familiarity and ease of use.¹⁷ The SBAR tool has also been shown to improve junior

doctors perception of handover communication in a time neutral fashion¹⁹ and other studies have suggested that staff found the use of the adapted SBAR tool helpful in both individual and team communications.²⁰ Based on the evidence above we chose to develop our pro forma using the SBAR tool.

Our aim was to produce an intuitive, easy to use pro forma that allowed for a more effective handover process comprising all relevant patient information and to facilitate safe storage of that information.

Our hypothesis was that ‘the implementation of a standardised handover sheet that has been internationally validated would improve the quality of handover information transfer’. We tested our null hypothesis.

This study was registered with our local audit lead for cardiothoracic intensive care and no ethical approval was required.

Methods

Setting

The audit was set in the CT ICU of St George’s Hospital (SGH) London. It is a tertiary referral centre for complex cardiothoracic medical and surgical cases from South West London and Surrey.

Patients/participants

We observed doctor-to-doctor handovers of patient information from day to night staff and vice versa. All doctors worked on the CT ICU and gave verbal consent. We observed the handover of 50 consecutive patients in two separate cycles. The first cycle monitored the existing handover style and the second was carried out once the new handover sheet had been introduced. With a small audit team it was decided that maximum of 50 patients would allow timely data collections and analysis given additional clinical duties by all parties involved.

Registration and ethical approval

Approval for this quality improvement project was obtained from the department audit lead. Doctors who participated gave verbal consent. As patient care was not altered, patient consent was not required.

Study methods

During the first audit cycle, we analysed the existing handover sheets and verbal information transferred during the doctor-to-doctor handover at SGH CT ICU of 50 consecutive patients.

The audit pro forma was designed using the widely recognised and validated Identification, Situation, Background, Assessment and Recommendation (ISBAR) tool to ensure all essential clinical

information was handed over. This included current test results, results pending, key medications as well as current diagnosis and management plans.

For each patient's handover we assessed whether each section of the ISBAR tool was discussed. A score (0–2) was assigned for each section. Zero being designated if no information in that category was transferred, one if the information was partially transferred and two if all relevant information in that category was transferred. Thus, each patient's handover received a score from 0 to 10 and with 50 patient's information being handed over per cycle, there was an overall score out of 500. We did not differentiate between information transferred verbally or in written format (or if duplicate information was transferred). The relative quality of handover was therefore a measure of the individual patient handover scores (0–10) and the overall score for each cycle (0–500).

Following each audited handover we reviewed the patient's notes including both current and pending results and recent bedside assessments to identify any relevant clinical information that was not transferred during handover. All new information identified was then conveyed to the current medical team to ensure patient safety and aid further management.

After the initial audit in Cycle 1 we then introduced the new handover sheet which was based on the ISBAR tool to aid the effectiveness of handover. This introduction was discussed at the CT ICU junior doctors teaching session the week before it was implemented and it was also emailed out to all members of the medical team that same week. We arranged the introduction of the new handover sheet for a week where we were both around to help with any implementation issues that may have arisen, fortunately there were none.

In Cycle 2, two weeks following the introduction of the ISBAR tool and a designated new handover sheet, we re-evaluated the doctor-to-doctor handover process.

Table 1 shows an example of our new handover sheet pro forma.

There were three of us involved in the audit and in both cycles we were the only auditors. The hand-over process in CT ICU involves a walk around the patient's bed-sides discussing each patient in turn with both day and night teams present. Therefore, the only way to audit their handover was to walk around the unit with them. As such, there was the potential for behavioural change as they were informed about what we were auditing, but this was a potential change for both cycles and unfortunately was not something we could conceivably alter.

We did the first five handovers in Cycle 1 together to ensure we were both scoring the same way in an effort to reduce the risk of bias within the study. We also tried to audit as big a range of our colleagues as possible rather than the same couple of people each time.

Statistical methods

Data were collected on Excel. Results for overall handover scores per cycle were analysed using Chi Square with one degree of freedom. Individual patient handover scores were analysed using Wilcoxon–Mann–Whitney testing.

Results

Figures 1 and 2 show the analysis of grouped data for 50 consecutive handovers at SGH prior to and following the implementation of the ISBAR handover tool respectfully.

The total score for the grouped handovers in Cycle 1 was 263/500 and Cycle 2 was 457/500. There was a significant difference between the total handover scores from Cycle 1 and 2 ($p < 0.001$). There was no significant difference in the total score for identification between the two cycles (83 versus 94, $p = 0.56$). There was a significant improvement in total score for handover of situation (48 versus 92, $p = 0.008$), background (43 versus 89, $p = 0.004$), assessment

Table 1. The table shows an example of the new pro forma we introduced.

Bed	Identification	Situation	Background	Assessment	Recommendations
I	John Doe Male DOB 01/01/1950 ID ABC123 Day 2	Out-of-hospital cardiac arrest VF Arrest, Immediate bystander CPR ROSC after 15 min, three shocks, two adrenaline Inferior STEMI and PCI to RCA Induced hypothermia	HTN Smoker 20 pack years No allergies Strong Family Hx. IHD	A – ETT, 8.0 @22 cm B – PCV, PEEP 8, PC 18, FIO2 40% C – Norad 0.1 mcg/kg/min, Sinus, Lac 1.4 D – GCS 3/15, Prop 100 mg/h, ALF 2 mg/h E – NG, BNO, UO 40–80 ml/h Micro – Nil micro results to date	1. CXR today (check NG position) 2. Cessation of cooling at 24 h 3. Chase bloods results 4. Update family

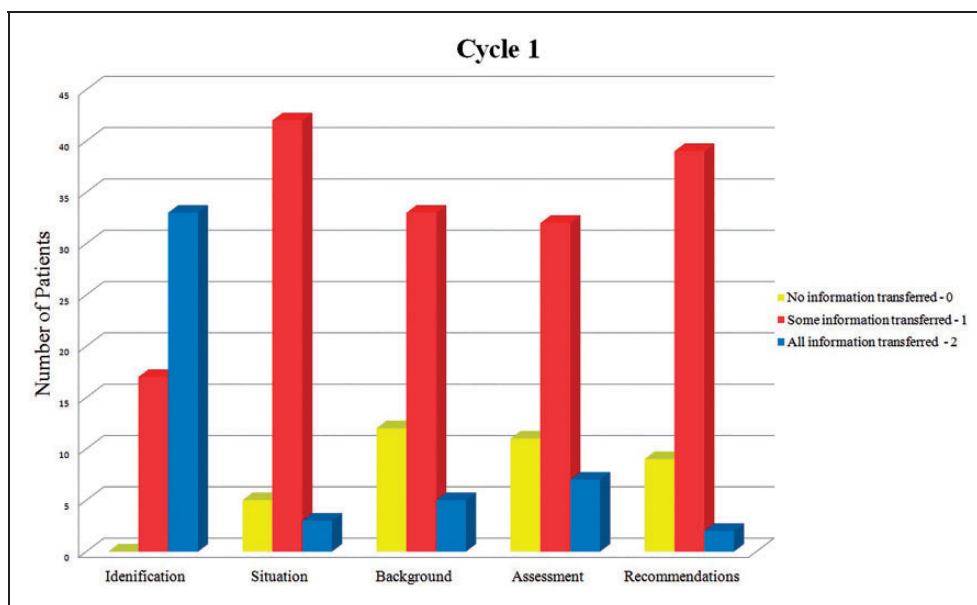


Figure 1. The figure demonstrates the analysis of grouped handover data for 50 consecutive patients prior to the implementation of the ISBAR handover tool in Cycle 1.

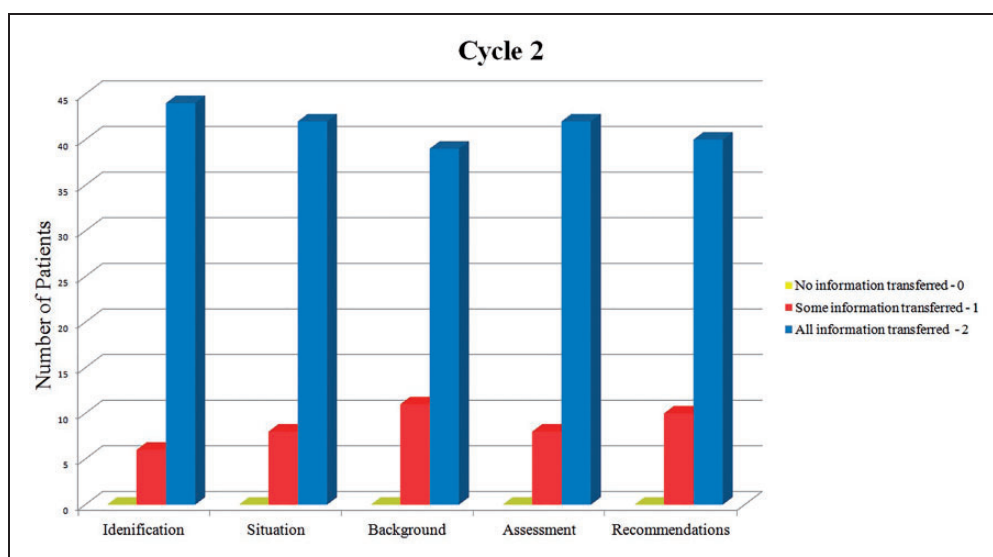


Figure 2. The figure demonstrates the analysis of grouped handover data for 50 consecutive patients following the implementation of the ISBAR handover tool in Cycle 2.

Table 2. The table demonstrates the patient handover scores for Cycle 1 and 2.

Patient handover score data	Cycle 1	Cycle 2
Mean	5.26	9.14
Lower quartile (Q1)	4	9
Median (Q2)	5	9
Upper quartile (Q3)	6	10

(46 versus 92, $p=0.005$) and recommendations (43 versus 90, $p=0.003$) between the two cycles.

Table 2 presents the mean, median and quartiles of patient handover scores for Cycle 1 and 2. (As said

previously each patient's handover is scored out of a maximum of 10.)

The median handover score for Cycle 1 was 5/10 (interquartile range (IQR) 4–6). The median handover score for Cycle 2 was 9/10 (IQR 9–10). Patient handover scores increased significantly between Cycle 1 and 2, $U=13.5$, $p<0.001$.

Discussion

What we found

Looking at the grouped handover results from this audit, it appears that the introduction of the ISBAR handover template has significantly improved the

quality of patient handover in SGH CT ICU (total scores, 259 versus 457, $p < 0.001$). Within the subsections of the handover only the 'identification' section was not significantly improved ($p = 0.56$). This is due to the fact that pre-existing handover sheets in SGH CT ICU had contained basic patient demographic data and hospital coding numbers. Impressively, all other sections (SBAR) have shown clinically and statistically significant improvements ($p < 0.001$) and hence an enhancement not only to the quality of the handover but also to patient safety as important information is not being missed or forgotten. Additionally, all information had been saved on a secure computer drive for future reference if needed.

Looking at individual patient handover scores we can see in Cycle 1 a median score of 5 (IQR 4–6) whereas, those in Cycle 2 had a median score of 9 (IQR 9–10). Thus, as hypothesised, 'the implementation of a standardised handover sheet that has been internationally validated (ISBAR tool) improved the quality of handover information transfer', $p < 0.001$.

This small and simple study identified an area of clinical practice that needed improvement. The second cycle showed a significant improvement in information transfer that occurred with the introduction of the ISBAR template to doctor-to-doctor handover of patient information.

Also, we must consider other factors that can improve information transfer at handover time. One example is that of location. Our handovers normally take place at the bed side of each patient however, research suggests that changing handover location (e.g. empty coffee room) can improve efficiency and minimise distractions that would adversely affect information transfer.²¹ Furthermore, we must define the level of seniority that must be present to facilitate handover. At present, the handover round is led by the senior registrar finishing their shift and the handover is to the oncoming senior registrar and doctors working the next shift. It would be interesting to see if a consultant presence improved the quality of the handover process as there is little background research demonstrating this. These are potential areas for change and should be discussed at a senior departmental level and should be the focus of future quality improvement projects as we continually strive to better our departmental handovers.

Prior to this audit commencing, there were no electronic or paper record of the substance of each handover. Thus, if needed for legal or coroners proceedings, no record of what information was handed over would be available. By designating a drive on the computer system these could be stored accordingly (hard drive, cloud or a paper folder) and reproduced when required.

Comparison to the published literature

Errors and omissions from handover result in dangerous consequences. Unfortunately, purely verbal

handovers are associated with information loss at every handover step and loss of all data after three handover cycles. In contrast, handovers using both a typed sheet combined with verbal information transmission resulted in minimal data loss.¹⁴ Standardisation of the handover process has been recommended by the WHO²² and shown to increase communication of crucial information regarding patient care.²³

Junior doctors commencing training at present will work in a variety of specialties before entering specialist training.²⁴ This exposes them to a variety of other handover forms that exist in different areas of the hospital.²⁵ However, these are not always appropriate in an intensive care setting. With many complex patients, each with multiple acute medical and chronic co-morbidities an accurate, detailed and efficient method of information transfer is needed. As shown in this brief study, the ISBAR handover tool offers these factors and has also been validated as a handover tool for junior doctors in previous studies.^{19,26}

Strengths and weaknesses of this study

This study does have limitations. We used small patient numbers in each cycle. Ideally, more would have been used but due to limitations on resources 50 were selected. With only three members in the auditing team and all with full-time clinical duties a smaller sample size of 50 patients per cycle was decided upon to allow for a palatable audit process. Despite these low numbers however, significance in the data still remains clear and it is important to perform 3–6 monthly audits to ensure that these standards are maintained (but hopefully further improved).

In addition, we identified a poor quality of information transferred with regards to infection and microbiology findings. This is particularly important in the intensive care setting.

In practice, it meant anti-microbial histories and recent pathogenic results were inadequately detailed. Using the old style handover, often microbiology or infection control data were not mentioned at all.

The introduction of the infection information in the 'assessment' section allowed a detailed handover of this matter as well. Being aware of a patient's antibiotic history and previous pathogen exposure is vital knowledge when considering future anti-microbial support but also in the prevention of cross infection to both other patients and staff members. The National Institute for Health and Care Excellence issued a quality statement in 2014 highlighting the importance of antibiotic stewardship in preventing the development of current and future bacterial resistance.²⁷ One of the key features is continual daily review as to the ongoing need for antibiotics in each individual case with targeted treatment according to pathogenic growth. Therefore, in order to facilitate good antibiotic stewardship our pro forma included a dedicated microbiology section aiming to detail all

relevant information encompassing the patient's admission.

Conclusions and future areas of focus and research

In conclusion, the introduction of a standardised handover template (ISBAR) has improved the quality and safety of the doctor-to-doctor patient information handover process in our ICU. It now allows for a uniform, thorough and clear means of information transfer and storage. We hope that it also paves the way for further improvements in information transfer and enhancements in overall patient safety. First, we intend to cement the use of this handover tool into day-to-day practice in our ICU. This requires a top-down approach where by senior staff members such as department leads, consultants, matrons and charge nurses must mandate its everyday use. This will keep the handover sheet itself always up to date and promote junior staff members to familiarise themselves with the ISBAR tool and practice the handover technique. Through regular re-audit (3–6 monthly, as said previously) we can ensure these standards are met. Additionally, we need to survey the doctors using this on a daily basis and ensure their satisfaction with it and allow feedback on advantages and disadvantages of the ISBAR tool. Finally, we would suggest to departmental leads for its use within other intensive care units in SGH (Neurosurgical, General and Paediatric ICU) and also on inter-departmental handovers (e.g. theatre to ICU, emergency department to ICU and ICU to ward care).

Declaration of conflicting interests

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